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PHOTOGRAPHIC
INTERPRETATION
REPORT

NATIONAL PHOTOGRAPHIC
INTERPRETATION CENTER

CONCRETE AND STEEL SUPPORT STRUCTURES FOR HARDENED DOME ANTENNAS AT ICBM COMPLEXES IN THE USSR (TSR)

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PIR-024/79

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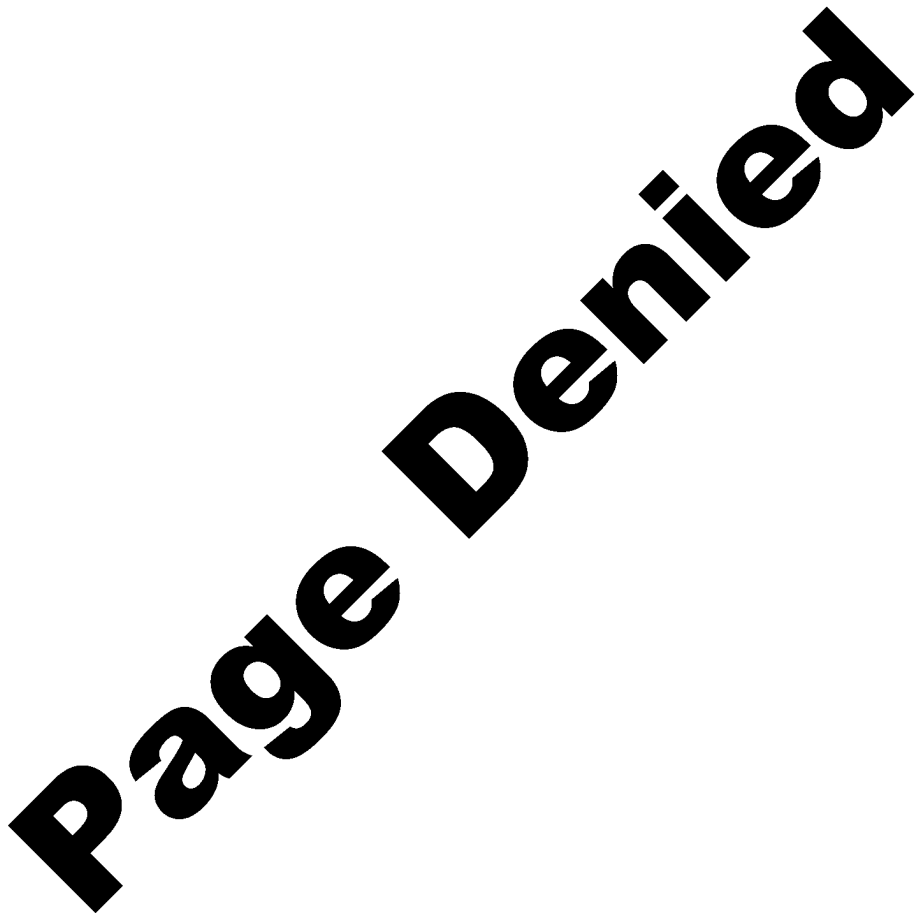

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CONCRETE AND STEEL SUPPORT STRUCTURES FOR HARDENED DOME ANTENNAS AT ICBM COMPLEXES IN THE USSR (TSR)

ABSTRACT

1. (TSR) Since early 1978, concrete and steel support structures for hardened dome antennas have been constructed in deep, square excavations near modified type III-X ICBM launch control facilities and associated launch sites in the USSR. This construction of concrete and steel support structures can now be described in detail because of repeated observations of the construction process. This report presents a detailed description of the construction of these support structures and contains a location map, line drawings, and seven annotated photographs.

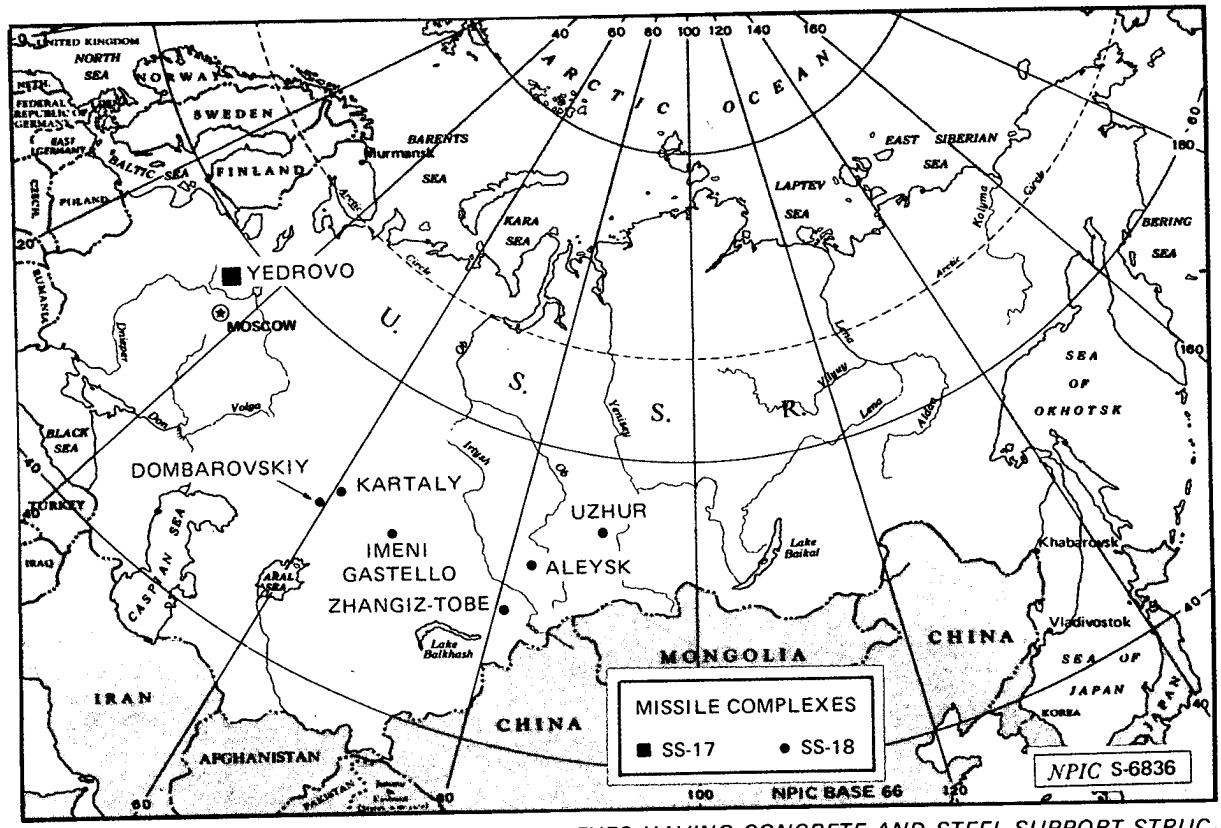

FIGURE 1. LOCATIONS OF SOVIET ICBM COMPLEXES HAVING CONCRETE AND STEEL SUPPORT STRUCTURES FOR HARDENED DOME ANTENNAS

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INTRODUCTION

2. (TSR) Before 1978, hardened dome antennas were constructed in shallow, circular excavations at type III-X ICBM launch control facilities (LCFs) and associated launch sites in the USSR. Since early 1978, however, hardened dome antennas have been constructed in concrete and steel support structures that are in deep, square excavations at modified type III-X ICBM LCFs* and associated launch sites (Figure 1). The construction of concrete and steel support structures for hardened dome antennas was first reported by NPIC in June 1978[1] and can now be described in detail because of repeated observations of the construction process. Figure 2 presents detailed line drawings of a top and a side view of one of these structures with a dome antenna in position. Figures 3 through 9 show the sequence of construction through the use of annotated photographs.

BASIC DESCRIPTION

3. (TSR) Concrete and steel support structures are currently being constructed for hardened dome antennas. These structures consist of three subassemblies: a concrete base, a steel honeycomb block with a concrete slab exterior, and a concrete housing for the hardened dome antenna. At the beginning of the construction sequence for the support structure, a [redacted]** square excavation is dug, and a concrete base is constructed in it (Figure 3). Next, a steel honeycomb block, [redacted], is centered on the concrete base. The honeycomb block may be constructed either aboveground before being placed in the excavation or in the excavation itself (Figure 4). The individual structural members of the honeycomb block could not be measured on available imagery, but they appear to consist of thick steel rods. Prefabricated rectangular concrete slabs are subsequently attached to the sides and top of the steel honeycomb block (Figure 5), producing the finished appearance of a solid concrete block. The purpose of the spaces in the steel honeycomb block could not be determined from available imagery; however, no room-size spaces or corridors were discerned in it and only a narrow trench for an antenna feedline connects it to either the collocated LCF or launch silo. Once the exterior of the steel honeycomb block has been covered with concrete slabs, a steel framework for the dome antenna is placed on top. At this point, construction begins on the concrete housing for the dome antenna. The concrete housing probably is constructed by anchoring four [redacted] high corner posts to the upper corners of the steel honeycomb block and then attaching concrete walls to these posts (Figure 6). The space between these walls and the dome antenna framework is subsequently covered with concrete slabs (Figure 7). The dome antenna framework then is filled with concrete (Figure 8) and covered with an unidentified type of material having a rippled appearance. This rippled material may be a temporary protective cover for the antenna while backfilling of the concrete and steel support structure is underway. When construction is complete, a slightly domed, permanent lid which protrudes slightly above ground level is usually added to the antenna. This lid is often dark toned (Figure 9).

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*A modified type III-X LCF is [redacted] deeper than an unmodified one and has a control support building approximately 100 meters away rather than about 30 meters away.

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**The excavation depth may be less than 4.3 meters at deployment sites that are to be built up with dirt.

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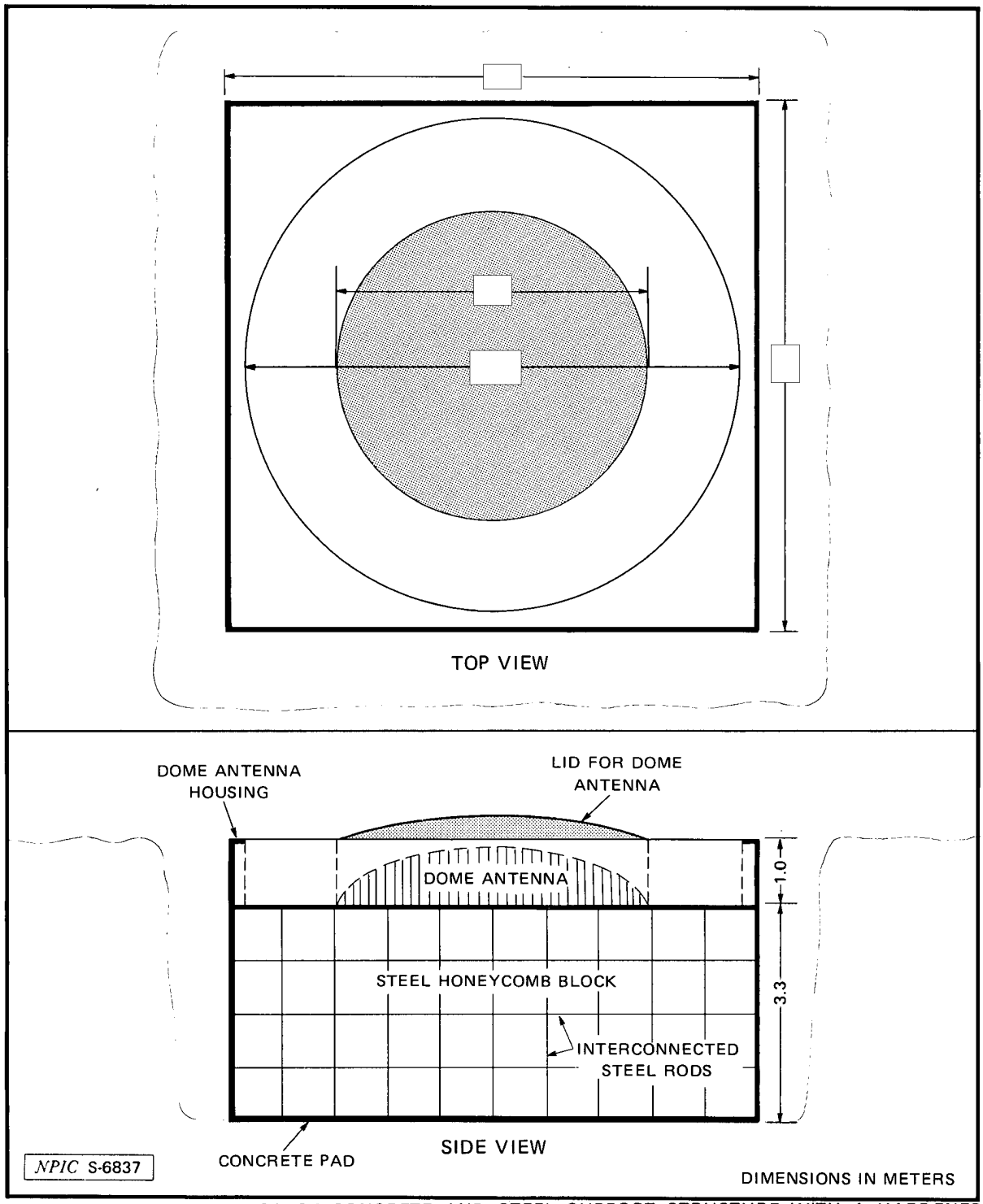

FIGURE 2. LINE DRAWINGS OF CONCRETE AND STEEL SUPPORT STRUCTURE WITH A HARDENED DOME ANTENNA IN POSITION. The dimensions on this line drawing are averages; actual dimensions may vary from facility to facility.

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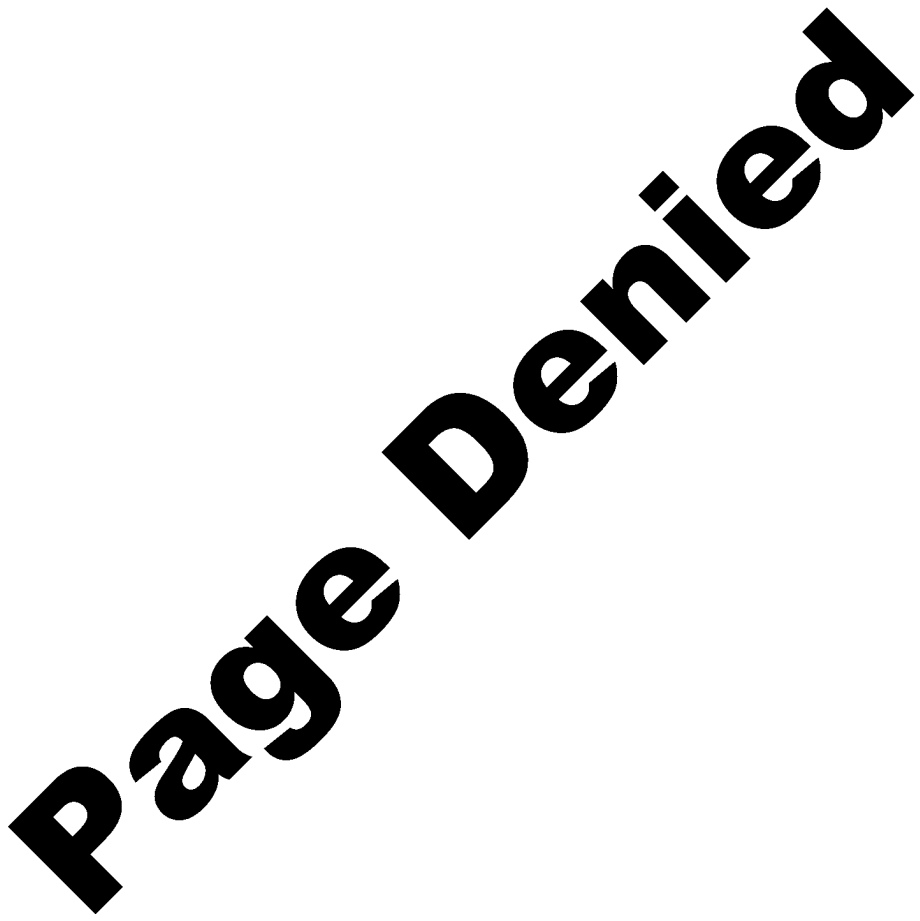


4. (TSR) The purpose of the concrete and steel support structure for the dome antenna is unknown; however, it seems likely that it provides some degree of hardness for the antenna. The spaces in the steel honeycomb block underneath the dome antenna may be an air cushion that could absorb some of the overpressure from a nuclear blast. The concrete housing for the dome antenna may provide a lateral air cushion, also for protection from a nuclear blast. The concrete and steel support structure may also provide an improved electrical environment for the operation of the dome antenna.

REFERENCES

IMAGERY

(TSR) All available KEYHOLE imagery acquired through [redacted] was used in the preparation of this report. 25X1

DOCUMENT

1. NPIC. [redacted] PIR-026/78, *Variations of Hardened Antennas at Modified Type III-X ICBM Launch Control Facilities, USSR,* Jun 78 (TOP SECRET [redacted] 25X1 25X1

RELATED DOCUMENT

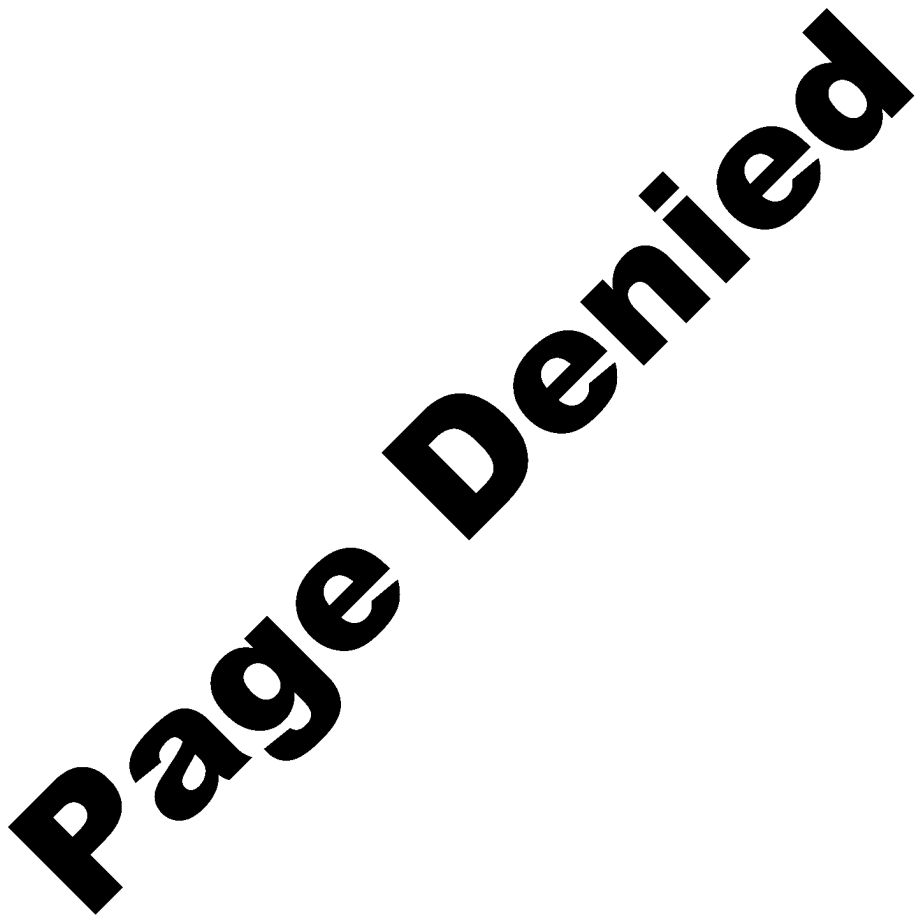
FTD. [redacted] Drawing No 78E1502, *Hardened Antenna Analysis (U),* 30 Jun 78 (TOP SECRET RUFF) 25X1

REQUIREMENT

Project 130069NC

(S) Comments and queries regarding this report are welcome. They may be directed to [redacted] 25X1
Soviet Strategic Forces Division, Imagery Exploitation Group, NPIC, [redacted] 25X1

[redacted] 25X1



List of Conversion Factors by Classification

UNITS OF LENGTH

IF YOU HAVE	*MULTIPLY BY*	*TO OBTAIN*
MILLIMETERS	0.0394	INCHES
CENTIMETERS	0.3937	INCHES
INCHES	25.4000	MILLIMETERS
INCHES	2.5400	CENTIMETERS
FEET	0.3048	METERS
FEET	0.0003	KILOMETERS
YARDS	0.9144	METERS
METERS	3.2808	FEET
METERS	0.0005	MILES(NAUTICAL)
METERS	1.0936	YARDS
KILOMETERS	3280.8400	FEET
KILOMETERS	0.6214	MILES(STATUTE)
KILOMETERS	0.5400	MILES(NAUTICAL)
MILES(STATUTE)	1.6093	KILOMETERS
MILES(NAUTICAL)	6076.1154	FEET
MILES(NAUTICAL)	1.8520	KILOMETERS
MILES(NAUTICAL)	1852.0000	METERS

UNITS OF AREA

IF YOU HAVE	*MULTIPLY BY*	*TO OBTAIN*
SQUARE CENTIMETERS	0.1550	SQUARE INCHES
SQUARE INCHES	6.4516	SQUARE CENTIMETERS
SQUARE FEET	0.0929	SQUARE METERS
SQUARE YARDS	0.8361	SQUARE METERS
SQUARE METERS	10.7639	SQUARE FEET
SQUARE METERS	1.1960	SQUARE YARDS
SQUARE METERS	1.0000	CENTARES
SQUARE METERS	0.0002	ACRES
SQUARE METERS	0.0001	HECTARES
ACRES	4046.8564	SQUARE METERS
ACRES	0.4047	HECTARES
HECTARES	10000.0000	SQUARE METERS
HECTARES	2.4711	ACRES

UNITS OF MASS

IF YOU HAVE	*MULTIPLY BY*	*TO OBTAIN*
KILOGRAMS	2.2046	POUNDS(AVOIR.)
POUNDS(AVOIR.)	0.4536	KILOGRAMS
SHORT TONS	0.9072	METRIC TONS
METRIC TONS	1.1023	SHORT TONS
METRIC TONS	0.9842	LONG TONS
LONG TONS	1.0160	METRIC TONS

UNITS OF VOLUME

IF YOU HAVE	*MULTIPLY BY*	*TO OBTAIN*
LITERS	0.2642	GALLONS
LITERS	0.0063	BARRELS(POL)
LITERS	0.0010	CUBIC METERS
GALLONS	3.7854	LITERS
GALLONS	0.1337	CUBIC FEET
GALLONS	0.0238	BARRELS(POL)
GALLONS	0.0038	CUBIC METERS
BUSHELS	0.0352	CUBIC METERS
CUBIC FEET	7.4805	GALLONS
CUBIC FEET	0.1781	BARRELS(POL)
CUBIC FEET	0.0283	CUBIC METERS
CUBIC YARDS	0.7646	CUBIC METERS
BARRELS(POL)	158.9873	LITERS
BARRELS(POL)	42.0000	GALLONS
BARRELS(POL)	5.6146	CUBIC FEET
BARRELS(POL)	0.1590	CUBIC METERS
CUBIC METERS	1000.0000	LITERS
CUBIC METERS	264.1721	GALLONS
CUBIC METERS	35.3147	CUBIC FEET
CUBIC METERS	28.3776	BUSHELS
CUBIC METERS	6.2898	BARRELS(POL)
CUBIC METERS	1.3080	CUBIC YARDS

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